CLAIMS

What is claimed, is:

1. A method for multilevel data communication comprising:
dividing a set of information bits to be transmitted into a first group and a second group;
encoding the first group to generate a block code ;
selecting a subset of symbols in a constellation of symbols in dependence on the block code according to a Gray-coded mapping function;
selecting a symbol within the subset in dependence on the second group according to a Gray-coded mapping function; and transmitting the selected symbol.

2. A method as claimed in claim 1, wherein the encoding comprises LDPC coding the first group to generate an LDPC code.

3. A method as claimed in claim 1, wherein the encoding comprises array coding the first group to generate an array code.

4. A method as claimed in claim 1, wherein the first group comprises least significant bits of the set of information bits and the second group comprises most significant bits of the set of information bits.

5. A method as claimed in claim 1, wherein the first group comprises most significant bits of the set of information bits and the second group comprises least significant bits of the set of information bits.

6. A method as claimed in claim 1, further comprising receiving the selected symbol and recovering the set of information bits from the selected symbol.

7. A method as claimed in claim 6, wherein the recovering of the set of information bits comprises soft demapping the received symbol to generate a probability for each of the bits represented in the symbol to have a particular value and decoding the received symbol to recover the set of information bits in dependence on the probabilities generated by the soft demapping and the received symbol.

8. An apparatus for multilevel data communication, the apparatus comprising:
a divider for dividing a set of information bits to be transmitted into a first group and a second group;
a block encoder connected to the divider for encoding the first group to generate a block code; and,
a symbol mapper connected to the divider and the block encoder for selecting a subset of symbols in a constellation of symbols in dependence on the block code according to a Gray-coded mapping function, selecting a symbol within the subset in dependence on the second group according to a Gray-coded mapping function, and transmitting the selected symbol.

9. Apparatus as claimed in claim 8, wherein the encoder comprises an LDPC encoder for coding the first group to generate an LDPC code.

10. A method as claimed in claim 8, wherein the encoding comprises array coding the first group to generate an array code.

11. Apparatus as claimed in claim 8, wherein the first group comprises least significant bits of the set of information bits and the second group comprises most significant bits of the set of information bits.

12. Apparatus as claimed in claim 8, wherein the first group comprises most significant bits of the set of information bits and the second group comprises least significant bits of the set of information bits.

13. Apparatus as claimed in claim 8, further comprising a receiver for receiving the selected symbol and recovering the set of information bits from the selected symbol.

14. Apparatus as claimed in claim 13 wherein the receiver comprises: a soft demapper for demapping the received symbol to generate a probability for each of the bits represented in the symbol to have a particular value and a decoder for decoding the received symbol to recover the set of information bits in dependence on the probabilities generated by the soft demapping and the received symbol.

15. A communications device comprising an information source for generating a set of information bits and apparatus for multilevel data transmission as claimed in claim 8 connected to the information source for transmitting the set of the information bits.

16. An article of manufacture comprising a computer usable medium having computer readable program code means embodied therein for causing multilevel data communication the computer readable program code means in said article of manufacture comprising computer readable program code means for causing a computer to effect the steps of claim 1.

17. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for multilevel data communication, said method steps comprising the steps of claim 1.

18. A computer program product comprising a computer usable medium having computer readable program code means embodied therein for causing multilevel data

communication, the computer readable program code means in said computer program product comprising computer readable program code means for causing a computer to effect the functions of claim 8.